HIGH PERFORMANCE NITRIDE-BASED LIGHT-EMITTING DIODES

ABSTRACT OF THE DISCLOSURE

A nitride-based light-emitting diode is provided, including a substrate having a light extraction layer grown on the substrate, and a nitride semiconductor epitaxy layer grown on the light extraction layer. The external quantum efficiency is improved by changing the traveling path of the emitted light and by matching the refraction index between the light extraction layer and the substrate. Also, a high power nitride-based light-emitting diode having a sacrificial layer is disclosed. A sacrificial layer is used for growing a light-emitting structure, and a binding layer made of two or more metals or alloys is used to bind the grown light-emitting structure and a substrate with high thermoconductivity. The sacrificial layer is later entirely etched away with a chemical solution used in a chemical etching process, and the nitrogen epitaxy structure is placed on the substrate with high thermoconductivity so that the diode can operate at high electrical current to improve external quantum efficiency.